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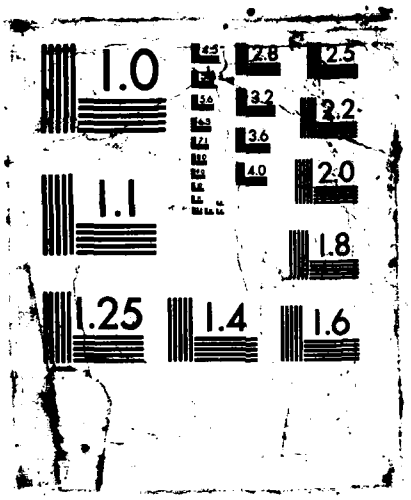
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This grant sponsored purchase of surface characterization spectrometers, data acquisition hardware, and sample manipulation for an ultrahigh vacuum chamber equipped with a scanning tunneling microscope. This apparatus is designed to map atomic-scale surface morphology of well-controlled samples, particularly for adsorbate-covered metal surfaces. The equipment assembly has been completed and experiments are underway.

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Final Report

Grant # AFOSR-86-0235

Principal Investigator: Ellen D. Williams

Department of Physics and Astronomy

University of Maryland

College Park, Maryland 20742

March 31, 1988

The instrumentation provided under this grant is in use in our on-going AFOSR research project; "Scanning Tunneling Microscopy as a Surface Chemical Probe". The application of each piece of equipment is listed below.

1. Micro-computer

The micro-computer is dedicated to real-time control and data-acquisition of the STM. Software has been developed to drive the STM scans under computer control while simultaneously reading the output of the feedback circuit. The data are then displayed on the monitor (in low resolution) and stored in an array in memory.

2. Graphics Software

A sophisticated commercial graphics software allows data manipulation and three-dimensional displays after data acquisition is complete.

3. Quadrupole Mass Spectrometer

The mass spectrometer is mounted on the UHV system housing the STM. It is used for partial pressure analysis of the background. In the future it will be used for measurement of thermal desorption spectra following STM scans of adsorbed overlayers.

4. X-Y recorder:

The recorder is used for routine acquisition of Auger and Appearance Potential spectra of samples.

5. LEED system:

The rear-view LEED optics are mounted on the vacuum system housing the STM. They are used for qualitative display of the diffraction structure of the samples. In the future, an existing video detector will be used to acquire quantitative beam profile measurements for comparison with the STM images.

6. Manipulator

The liquid-nitrogen cooled manipulator has been ordered and delivery is scheduled within a month. The cooling feature will be used to monitor the kinetic processes of surface facetting over temperature ranges down to 100 K.

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